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## PATENT SPECIFICATION



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### PROVISIONAL SPECIFICATION

**Improvements in and relating to, Aqueous Emulsions of Wax and Allied Materials and to Products and Articles containing, Impregnated, Coated, or Surface-sized with the same or resulting from Treatment with the same**

I, THURSTAN WYATT DICKESON, of 1A, Osborne Street, Newmarket, Auckland, New Zealand, of British Nationality, Chemist, do hereby declare the nature of this invention to be as follows:—

The following invention relates to emulsions of wax and allied materials and to products containing or impregnated with the same with special reference to the use of the aforesaid products in the paper and textile industry and to the surface sizing of paper by means of such emulsions.

Emulsions of wax and more especially those of paraffin wax have previously been prepared by the use of expensive emulsifying ingredients in an alkaline aqueous medium and have been sensitive to the presence of small quantities of electrolytes as well as to environmental changes. Such emulsions tend to form a crust of wax on the surface and are generally unsuitable for use in the paper and textile industries where uniform dispersion and deposition of the wax are essential. It has now been discovered that emulsions of paraffin and other waxes can be produced in a cheap and effective manner by the use of gelatinous metallic hydroxides or oxides, other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, or mixtures thereof, such as aluminium hydroxide other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, zinc hydroxide or copper hydroxide, and that such emulsions are very stable on storage, unaffected by the presence of hard waters, or small concentrations of acids, alkalis, or other electrolytes, and can be heated for a considerable period at the boiling point of water without splitting up.

The metallic hydroxide for use as the emulsion stabiliser should be in as bulky and gelatinous form as possible; the following method is given merely by way of illustration of a method of precipitating aluminium hydroxide in a condition suitable for the emulsification of wax. Dis-

solve 100 lbs. of aluminium sulphate in 50 400 gallons of water and add to it a solution of 40 lbs. of caustic soda in 50 gallons of water until there is a slight excess of alkali. The precipitation is preferably carried out at room temperature. Wash 55 the gelatinous precipitate well by decantation. Aluminium hydroxide other than activated gelatinous alumina as defined in the Patent Specification No. 487,855 is most generally useful as an emulsifying 60 agent for paraffin and other waxes but other gelatinous hydroxides other than activated gelatinous alumina as defined in the Patent Specification No. 487,855 may be equally successfully applied. The 65 gelatinous hydroxides or oxides used for the purpose of emulsifying waxes should be stored in the form of an aqueous paste or jelly of, say, 5%—15% (dry weight) oxide content, since, if allowed to become 70 dry they lose their emulsifying properties. In general the amount of gelatinous oxide required to emulsify the wax is of the order of  $\frac{1}{2}$ % to 2% (dry weight) of the weight of wax but for some purposes the 75 amount of hydroxide may with advantage be considerably in excess of that required merely for emulsification.

The following is one example of a method of manufacture of a wax emulsion 80 according to the present invention, given merely by way of illustration:

Prepare an aqueous suspension of gelatinous aluminium hydroxide by dilution of the paste or jelly described above so 85 that the alumina (dry weight) content is 0.65%. Bring this suspension to the boil and add to it a third of its weight of molten paraffin wax. Emulsify the mixture by the use of any suitable 90 agitator, homogeniser or colloidal mill and allow to cool.

Any other wax or mixture of waxes melting below the boiling point of water may be emulsified by a similar process. 95 Instead of aluminium hydroxide other than activated gelatinous alumina as defined in the Patent Specification No.

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487,855, any other gelatinous metallic oxide or hydroxide or mixture of oxides and hydroxides other than activated gelatinous alumina as defined in the Patent Specification No. 487,855 may be substituted. Additions of other materials immiscible with water and capable of emulsification may be made to the wax. As an example of this rosin may be mentioned which, when added to the wax and emulsified, gives a product suitable for use as a paper size.

Emulsified wax products as described above are extremely valuable in the manufacture of paper and paper products. Thus the addition of a paraffin wax emulsion or paraffin wax-rosin emulsion to the pulp in the beaters leads to the production of a sized paper of special properties. Furthermore the application of a dilute paraffin wax emulsion by a suitable mechanical means to the surface of an unsized or only partially sized paper or board, produces a sized paper or board. Such paper or board which has been surface-sized by the use of paraffin wax or other wax emulsions according to the present invention is much stronger than the corresponding engine-sized product and the cost of sizing is considerably reduced.

Wax emulsions according to the present invention may be used to coat the surface of paper or board with a film of wax to produce a waterproof product. Hitherto this process has been carried out by

dipping the paper into a bath of molten wax and scraping off as much as possible of the adhering wax. If now a paraffin wax emulsion according to the present invention, containing from 5% to 30% of wax, is substituted for the molten wax and the paper is subsequently heated to melt the wax to a homogeneous film and at the same time to evaporate off the water of the emulsion, a waterproof paper is produced which contains only a fraction of the minimum amount of wax which would have been coated by the old process. Papers coated with wax in the new way just described have also the advantage that they retain the original appearance of the surface and do not become "greasy" in the manner of waxed papers as prepared hitherto.

This invention is especially applicable to the cheap production of washable wall-papers. Another special application of the present invention is to the waxing of coarboard containers intended for the storage of food or other materials.

Emulsions of wax and like materials according to the present invention may also be used for the finishing and waterproofing of fibres and textiles of all kinds.

Dated this 7th day of October, 1939.

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### COMPLETE SPECIFICATION

#### Improvements in and relating to the Production of Sized or Waxed Paper and Paper Products, Fibres and Textiles, and Articles composed of the same

I, THURSTAN WYATT DICKESON, of 1A, Osborne Street, Newmarket, Auckland, New Zealand, of British Nationality, Chemist, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the production of sized or waxed paper and paper products, fibres and textiles, and articles composed of the same, by the utilisation of emulsions of wax and allied materials instead of wax and the like.

Emulsions of wax and more especially those of paraffin wax have previously been prepared by the use of expensive emulsifying ingredients in an alkaline aqueous medium and have been sensitive to the presence of small quantities of electrolytes as well as to environmental

changes. Such emulsions tend to form a crust of wax on the surface and are generally unsuitable for use in the paper and textile industries where uniform dispersion and deposition of the wax are essential. Emulsions of paraffin and other waxes and allied materials can, however, be produced in a cheap and effective manner, which is not claimed to be new, by the use of gelatinous metallic hydroxides or oxides, or mixtures thereof, such as aluminium hydroxide, zinc hydroxide or copper hydroxide, and such emulsions are very stable on storage, unaffected by the presence of hard waters, or small concentrations of acids, alkalis, or other electrolytes, and can be heated for a considerable period at the boiling point of water without splitting up. It has been discovered that these emulsions are extremely valuable in the manufacture

or treatment of paper and paper products, fibres and textiles, and articles composed of the same.

According to the present invention in order to produce the aforesaid sized or waxed products, there are added or applied, in the manufacture or treatment of paper and paper products, fibres and textiles, and articles composed of the same, the said emulsions of wax and allied materials produced by using as emulsifying agents gelatinous metallic hydroxides or oxides, with the exception of activated gelatinous alumina as defined in my Patent Specification 487,855. It is to be understood that hereafter in this specification the emulsions referred to for use in the present invention are the said emulsions with the exception of those produced by using the said activated gelatinous alumina.

The metallic hydroxide for use as the emulsion stabiliser in the emulsions employed in processes to which this invention relates should be in as bulky and gelatinous form as possible. The following method is given merely by way of illustration of a method of precipitating aluminium hydroxide in a condition suitable for the emulsification of wax for use in the present invention. Dissolve 100 lbs. of aluminium sulphate in 400 gallons of water and add to it a solution of 40 lbs. of caustic soda in 50 gallons of water until there is a slight excess of alkali. The precipitation is preferably carried out at room temperature. Wash the gelatinous precipitate well by decantation. The gelatinous hydroxides or oxides used for the purpose of emulsifying waxes should be stored in the form of an aqueous paste or jelly of, say, 5%—15% (dry weight) oxide content, since, if allowed to become dry they lose their emulsifying properties. In general the amount of gelatinous oxide required to emulsify the wax is of the order of  $\frac{1}{2}$ % to 2% (dry weight) of the weight of wax but for some purposes the amount of hydroxide may with advantage be considerably in excess of that required merely for emulsification.

The following is one example of a method of manufacture of a wax emulsion suitable for use in the present invention, given merely by way of illustration:

Prepare an aqueous suspension of gelatinous aluminium hydroxide by dilution of the paste or jelly described above so that the alumina (dry weight) content is 0.65%. Bring this suspension to the boil and add to it a third of its weight of molten paraffin wax. Emulsify the mixture by the use of any suitable agitator homogeniser or colloidal mill and allow to cool.

Any other wax or mixture of waxes melting below the boiling point of water may be emulsified by a similar process. Instead of aluminium hydroxide other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, other gelatinous metallic oxides or hydroxides or mixtures of oxides and hydroxides may be substituted. Additions of other materials immiscible with water and capable of emulsification may be made to the wax. As an example of this rosin may be mentioned which, when added to the wax and emulsified, gives a product suitable for use as a paper size.

In the manufacture of paper in accordance with the present invention sized paper of special properties may be produced by the addition of the wax emulsion, for instance, paraffin wax emulsion or paraffin wax-rosin emulsion to the pulp in the beaters. Furthermore the application of a dilute paraffin wax emulsion by a suitable mechanical means to the surface of an unsized or only partially sized paper or board, produces a sized paper or board. Such paper or board which has been surface-sized by the use of paraffin wax or other wax emulsions is much stronger than the corresponding engine-sized product and the cost of sizing is considerably reduced.

Wax emulsions, according to the present invention, may be used to coat the surface of paper or board with a film of wax to produce a waterproof product. Hitherto this process has been carried out by dipping the paper into a bath of molten wax and scraping off as much as possible of the adhering wax. If now paraffin wax emulsion containing from 5% to 30% of wax is substituted for the molten wax and the paper is subsequently heated to melt the wax to a homogeneous film and at the same time to evaporate off the water of the emulsion, a waterproof paper is produced which contains only a fraction of the minimum amount of wax which would have been coated by the old process. Papers coated with wax in the new way just described have also the advantage that they retain the original appearance of the surface and do not become "greasy" in the manner of waxed papers as prepared hitherto.

This invention is especially applicable to the cheap production of washable wall-papers. Another special application of the present invention is to the waxing of cardboard containers intended for the storage of food or other materials.

The emulsions of wax and like materials may also be used for the finishing and waterproofing of fibres and textiles of all kinds.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In the manufacture of sized or waxed paper and paper products, the addition to the paper pulp, preferably in the beaters, of an emulsion of wax or an allied material, produced by using as emulsifying agent a gelatinous metallic hydroxide or oxide, other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, for instance, a paraffin wax emulsion, or a paraffin wax-rosin emulsion.
2. Sized paper and sized paper products produced by the method contained in Claim 1.
3. The application of a dilute wax emulsion, for instance, paraffin wax emulsion, produced by using as emulsifying agent a gelatinous metallic hydroxide or oxide, other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, by suitable mechanical means to the surface of an unsized or only partially sized paper or board.
4. Sized paper or board produced by the method claimed in Claim 3.
5. Method of manufacturing waterproof paper or board, or articles, such as cardboard containers, composed of the

same, the surface of which is coated with a film of wax, consisting in applying an aqueous emulsion of wax, or of a material allied thereto, produced by using as emulsifying agent a gelatinous metallic hydroxide or oxide, other than activated gelatinous alumina as defined in the Patent Specification No. 487,855, to the paper, board, or article, and in heating the paper, board, or article, to melt the wax to a homogeneous film and to evaporate off the water of the emulsion.

6. Waxed waterproof paper, board, or containers, produced by the method claimed in Claim 5.

7. Method of finishing and waterproofing fibres and textiles of all kinds, consisting in treating the same with an emulsion of wax or an allied material produced by using as emulsifying agent a gelatinous metallic hydroxide or oxide, other than activated gelatinous alumina as defined in the Patent Specification No. 487,855.

8. Fibres and textiles of all kinds, produced by the method claimed in Claim 9.

Dated this 20th day of March, 1940.

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